



US009637014B2

(12) **United States Patent**  
**Schneider et al.**

(10) **Patent No.:** **US 9,637,014 B2**

(45) **Date of Patent:** **May 2, 2017**

(54) **ALIGNMENT, VERIFICATION, AND  
OPTIMIZATION OF HIGH POWER  
WIRELESS CHARGING SYSTEMS**

(75) Inventors: **Jesse M. Schneider**, Cranston, RI (US);  
**Jonathan J. O'Hare**, Warwick, RI  
(US)

(73) Assignee: **WIRELESS EV Charge, LLC**,  
Warwick, RI (US)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 68 days.

(21) Appl. No.: **14/127,071**

(22) PCT Filed: **Jun. 28, 2012**

(86) PCT No.: **PCT/US2012/044517**

§ 371 (c)(1),  
(2), (4) Date: **Mar. 21, 2014**

(87) PCT Pub. No.: **WO2013/003527**

PCT Pub. Date: **Jan. 3, 2013**

(65) **Prior Publication Data**

US 2014/0217966 A1 Aug. 7, 2014

**Related U.S. Application Data**

(60) Provisional application No. 61/502,322, filed on Jun.  
28, 2011, provisional application No. 61/595,155,  
filed on Feb. 6, 2012.

(51) **Int. Cl.**

**H02J 7/00** (2006.01)

**H01F 37/00** (2006.01)

**B60L 11/18** (2006.01)

**H02J 7/02** (2016.01)

**H02J 5/00** (2016.01)

(52) **U.S. Cl.**

CPC ..... **B60L 11/182** (2013.01); **B60L 11/1829**  
(2013.01); **H02J 7/025** (2013.01); **H02J 5/005**  
(2013.01); **Y02T 10/7005** (2013.01); **Y02T**  
**10/7072** (2013.01); **Y02T 90/12** (2013.01);  
**Y02T 90/121** (2013.01); **Y02T 90/122**  
(2013.01); **Y02T 90/125** (2013.01); **Y02T 90/14**  
(2013.01)

(58) **Field of Classification Search**

CPC B60L 11/182; B60L 11/1838; B60L 11/1818;  
B60L 11/1846; B60L 11/1862; H04B  
5/0037; H02J 7/025  
USPC ..... 320/109, 108; 307/104  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,461,298 A \* 10/1995 Lara ..... B60L 3/0046  
320/109  
5,617,003 A 4/1997 Odachi  
6,260,649 B1 \* 7/2001 Carney, Jr. .... B60L 7/12  
180/220

(Continued)

*Primary Examiner* — M'Baye Diao

(74) *Attorney, Agent, or Firm* — Chace Ruttenberg &  
Freedman LLP

(57)

**ABSTRACT**

Provided are a method and apparatus and method for the  
alignment, verification and optimization of wireless charg-  
ing systems manufactured for use and used with electric  
vehicles. With some minimal modifications the same appa-  
ratus may be used to align a charging coil mounted on a  
vehicle with a charging coil, mounted on or in an electric  
vehicle charging bay or parking space, or to verify and  
optimize manufactured wireless vehicle charging system  
elements before they are installed.

**15 Claims, 5 Drawing Sheets**

